Chapter 3   Army SATCOM Requirements

Contents

Warfighting requirements will continue to grow at rates rivaling the growth of information needs in the commercial world.

OVERVIEW

Warfighting requirements are the foundation upon which future military satellite communications architectures will be built (figure 3-1). The design of a responsive future architecture must be based on a critical analysis of all requirements. Under the most realistic assumptions, requirements will continue to grow at rates rivaling the growth of information needs in the commercial world.

Defining realistic military communications requirements and joint coordination of them is difficult. The technology is often evolving more rapidly than the current planning process and certainly faster than the acquisition process!

Force projection and deployment strategies, unpredictable conflict areas, and a lack of modern infrastructure in many of the world's hot spots place greater demands upon Satellite Communications (SATCOM) than ever before. No two user communities have identical communications needs and differing operational environments call for solutions designed with as much flexibility as possible.

The Army has a requirement to support the three fundamental National Military Strategy (NMS) demands: peacetime engagement, deterrence and conflict, and to fight and win our nation's wars. SATCOM is vitally important in each of these NMS demands because, in order to
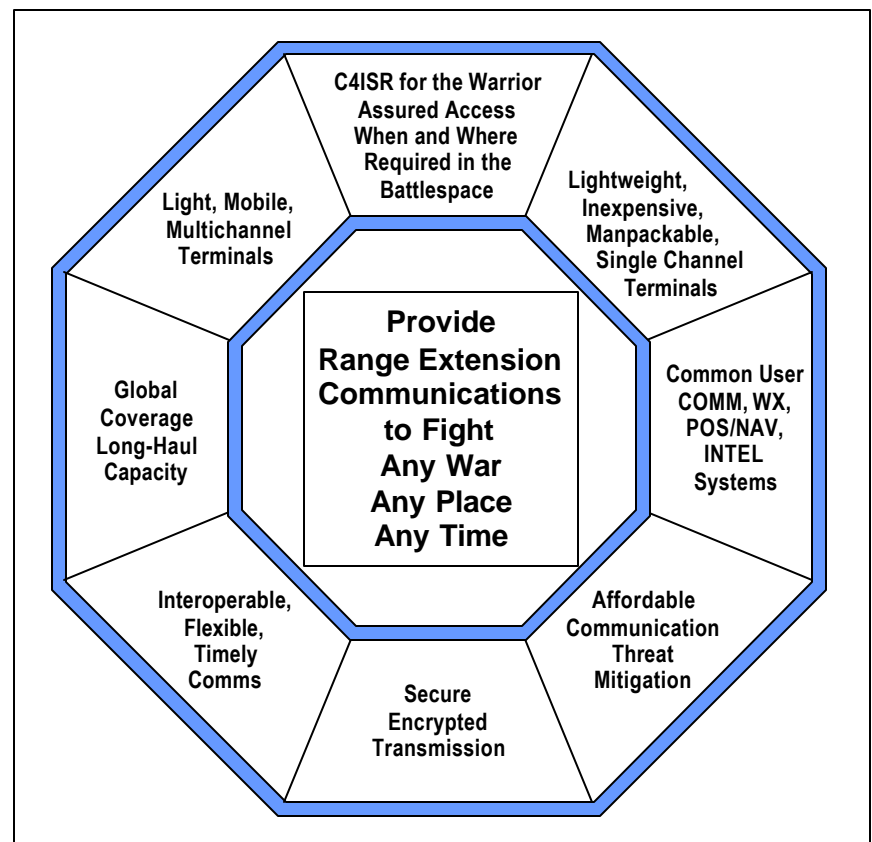

Figure 3-1. The Army SATCOM Architecture
is Built Upon Warfighter Requirements

The warfighter is concerned with fighting the battle and having the communications resources he needs when he needs them in order to accomplish his mission.

execute the NMS, the Army must maintain forces to support the global projection of U.S. power and influence. Force projection requirements include timely worldwide reconnaissance and surveillance; effective communications and dissemination of information; capability to manage split-based operations, accurate location of assets and forces, and the ability to deny the enemy knowledge of friendly operations, capabilities, and intentions. In military operations other than war, SATCOM can assist the Army in providing essential information to support security assistance, assessing and providing disaster relief, and humanitarian assistance.

COMMON CHARACTERISTICS OF SATCOM REQUIREMENTS

The warfighter does not differentiate between the types of communications services he needs by dividing them between high capacity or low capacity, military or commercial. The warfighter is concerned with fighting the battle and having the communications resources he needs when he needs them in order to accomplish his mission. To ensure that the operational commander will have the right information at his disposal, requirements are stated with reference to a common set of system characteristics that are essential to support operations. These characteristics include the following:

Interoperability

Satellite communications systems are components of the overall global information infrastructure. They must interoperate beyond local theaters of operations into the overall information net. Through the use of teleports, Standardized Tactical Entry Point, and the global terrestrial network, the

warfighter can extend the range of information services available to him in order to support his operations. The procurement of common satellite ground terminals will aid in achieving complete interoperability with other systems and Services.

Global Coverage

Warfighters need the capability to access communications support from any location around the world including the polar regions. Experience from recent conflicts has indicated a high likelihood that U.S. forces will be engaged in concurrent, multiple, regional conflicts. Warfighters rely on SATCOM systems to support continuous operations worldwide, and to accommodate, simultaneously, widely dispersed forces in various stages of employment, from training to combat.

Assured Access

Warfighters need assured access to SATCOM services to exercise positive command and control and to disseminate intelligence during all operational phases. A warfighter's access to these services must, therefore, be available on demand for the duration of the mission. Assured, real-time access to satellite communications capabilities allows the warfighter to collect and disseminate intelligence and execute orders rapidly enough to operate before the enemy can react.

Flexibility

The warfighter needs the ability to adjust supporting space and terrestrial-based communications capabilities to match the dynamics of the operational environment. This requires flexibility in each segment of the SATCOM system. Satellite repositioning, terminal mobility, frequency selection, and system

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resource allocation represent different options allowing the user and system manager flexibility in responding to rapidly changing operations, threats, and geographic needs.

OBJECTIVES DRIVE REQUIREMENTS

Department of Defense (DoD) satellite communications systems can take many years to move from initial concept to the first launch of the system. Once they are launched successfully and turned on, the communications payloads onboard DoD satellites can be expected to operate for over ten years. Detailed user requirements and doctrine are difficult to forecast over such a long period of time so the Army SATCOM architecture should not be optimized to meet current needs.

Future capacity is impossible to measure precisely. Educated guesses can be made, however, based on the amount and types of services that will be required. The introduction of new weapons and information systems, insertion of new technologies, acquisition and use of increasing amounts of commercial SATCOM services, evolving Army warfighting doctrine, and changes in force structure dramatically influence the capacity requirements of the next century (figure 3-2).

Army space objectives cover a wide area of strategic, operational, and tactical missions across the spectrum of military operations:

Detailed user requirements and doctrine are difficult to forecast over such a long period of time so the Army SATCOM architecture should not be optimized to meet current needs.
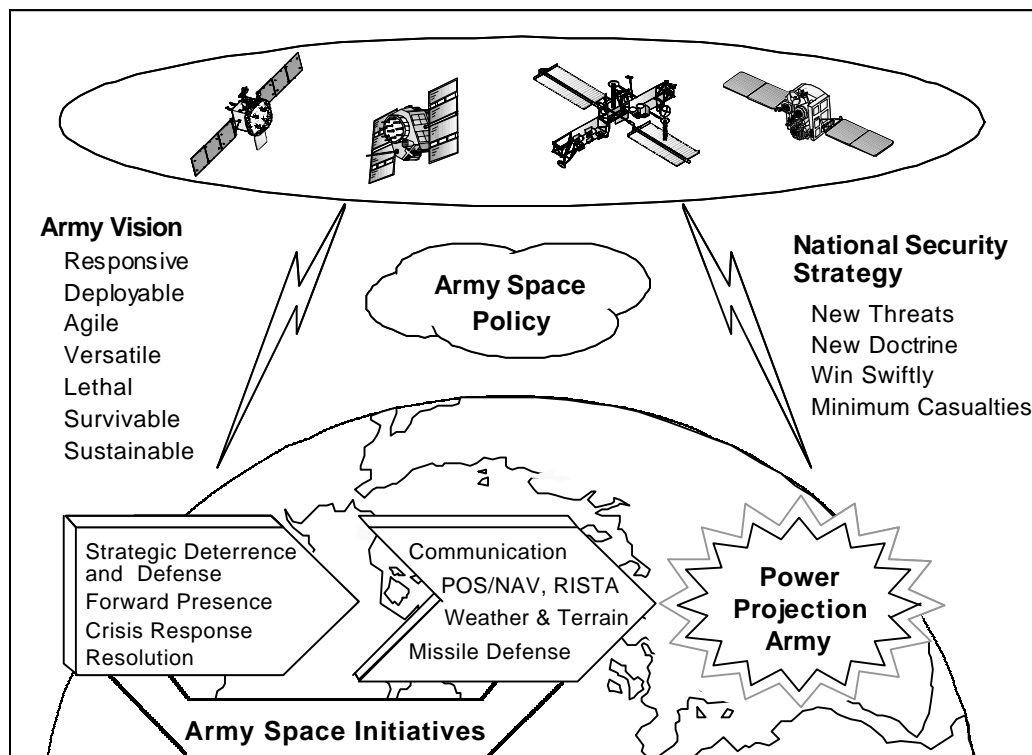
Army Vision
Responsive
Deployable
Agile
Versatile
Lethal
Survivable
Sustainable

Army Space Policy

National Security Strategy
New Threats
New Doctrine
Win Swiftly
Minimum Casualties

Strategic Deterrence and Defense
Forward Presence
Crisis Response
Resolution

Communication
POS/NAV, RISTA
Weather & Terrain
Missile Defense

Power Projection Army

Army Space Initiatives

Figure 3-2. There are a Variety of Influences Which will Impact Future SATCOM Capacity for the Warfighter

Communications satellites are the cornerstone of the Army's command and control architecture.

The importance of communications increases as the Army's missions become more complex and force levels decrease.

Demand for SATCOM services usually exceeds capacity of the available systems, so access to military satellite channels are at a premium and are closely monitored.

Communications

Communications satellites are the cornerstone of the Army's command and control architecture. The Army needs a worldwide, responsive, strategic, and tactical communications architecture. This requires an optimum mix of space and terrestrial communications capabilities across the entire frequency spectrum using military and commercial systems. The importance of communications increases as the Army's missions become more complex and force levels decrease.

Satellite communications systems, being virtually free of terrestrial line-of-sight restrictions, can significantly enhance Army communications capabilities by extending the range and reliability of networks. Success on that volatile modern battlefield will demand flexible, highly mobile, responsive, reliable, secure, jam-resistant, and survivable communications. Satellites are used largely to augment ground based communications systems, providing communications links not only to forces employed in an area of responsibility, but also to deploying forces while enroute. However, during deployments to contingency areas having little or no infrastructure to support command and control, satellites become the primary means of communications. SATCOM provides the following advantages which make them ideal for force projection operations:

• Greater freedom from siting restrictions.

• Extended range, capacity, and coverage.

• Real-time and store-and-forward capabilities.

• Stand-alone capability and reduced logistical support on the battlefield.

• Freedom from rigid network configurations.

• Mobility and rapid emplacement.

• Extremely high circuit reliability.

Military and commercial SATCOM systems are important assets that can be used at all echelons of command. Military command and control nets are usually routed through military satellites to assure their availability with the security and jamming resistance necessary for those types of communications. Typically, our access of military satellites for contingencies and exercises have host nation preapproval in allied nations around the world. Lacking the requirement for protection as for command and control nets, administrative and logistics networks can use either military or commercial satellites to provide routine support of force projection and split-based operations worldwide. Demand for SATCOM services usually exceeds capacity of the available systems, so access to military satellite channels are at a premium and are closely monitored. Consequently, Army forces must clearly define and articulate their requirements for critical command and control connectivity. The Army must consider the use of commercial satellites as an alternative means of satisfying their communication requirements.

Positioning/Navigation

Positioning and navigation satellites currently support fast-paced efficient maneuver and the reduction of fratricide by providing extremely accurate, three-dimensional location data for continuous day and night

operations. The Global Positioning System (GPS) is a space-based, all-weather, jam-resistant continuous operation radio navigation system that provides military users highly accurate worldwide position and location data, as well as velocity information and precision time. GPS provides an important common frame of reference for situational awareness. Beginning in 2000, by congressional mandate, GPS will be integrated into existing and programmed systems within all battlefield functional areas to improve command, control, and synchronization among Army forces, other Services, and allies.

Reconnaissance, Intelligence, Surveillance, and Target Acquisition

Space-based sensors have the advantage of unrestricted access over battlefields and other areas that are difficult to observe due to political or military reasons. National space systems provide information about worldwide areas of operation even though the Army may be denied physical access. National products, such as those delivered by the Army's Tactical Exploitation of National Capabilities (TENCAP) are therefore essential to planning and conducting military operations. The TENCAP Program focuses on tactical applications of the national space systems and it provides Army commands with equipment that can receive and process data from these systems. Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA) developments must enhance the commander's ability to see the battlefield and target the enemy.

Weather/Environmental Monitoring

Detailed analysis of weather and terrain is a critical step in the Intelligence Preparation of the Battlefield process. Weather and terrain conditions impact on friendly and enemy capabilities to move, shoot, and communicate. To optimize the capabilities of modern weapons systems, the tactical commander requires real-time weather and terrain information about his battle space. Satellites with weather and terrain monitoring sensors are a vital component in the information collection system. Weather and terrain information must be collected and downlinked to a ground processing unit where it can be used to prepare tailored products to support decision making by the tactical commander.

A far term goal is to provide the commander with tailored weather information together with environmental/topographical products to augment his intelligence about the situation on or near the battlefield.

Strategic Defense

The Defense Support Program (DSP) offers an early warning missile surveillance capability during military operations. The DSP satellite constellation recognizes the launch of strategic and certain tactical missiles using infrared sensors to detect heat from missile plumes. The United States Space Command exercises combatant command of the DSP through the Air Force Space Command. Warning information consists of assessments of the times and places of launches, the types of missiles launched, and the missiles' estimated course/direction. The DSP will be replaced by the Space-Based Infrared Radar System (SBIRS) early in the next century. More information on SBIRS can be found in Chapter 9.

Missile warning information is provided to supported Commanders in Chief via voice and data communica-

In Yugoslavia, NATO used information derived from two radar-imaging satellites known as Lacrosse. Each Lacrosse crossed the Balkans twice a day, peering down through bad weather to show commanders where to strike and what damage was caused by strikes. Lacrosse could see objects as small as 12-inches in diameter at night, and in bad weather. Larger objects, like tanks and SAM missiles, could be seen even if hidden in the woods.

FYI

The Tactical Event Reporting System (TER) will transition to the Tactical Event System (TES) in the near future. TES will use the same communications architecture currently used by TERS but will provide more timely and reliable missile launch warning.

tions. Ultra high frequency SATCOM is used to disseminate voice warnings, and the Tactical Event Reporting System (TERS) is used to disseminate formatted missile warning data. The launch warning data is communicated to Army forces within a theater to support theater missile defense operations. Today, warning information is centrally processed in the Continental United States and transmitted to the user. The Joint Tactical Ground Station (JTAGS) is a new satellite receiver that will process and disseminate DSP data directly downlinked in theater. JTAGS is capable of providing more accurate missile tactical parameters, including estimated impact area.

TACTICAL FORCE SATCOM REQUIREMENTS

The communications requirements for the warfighter vary across operational missions and threat environments. Figure 3-3 provides a view of the tactical warfighter satellite communications requirements. The Pentagon represents the National Command Authority. There is a need for communications extending from the White House/senior military leadership all the way to the warfighting commander's mobile radio, whether it be airborne, ground mobile, or manpacked, and regardless of geographic location.
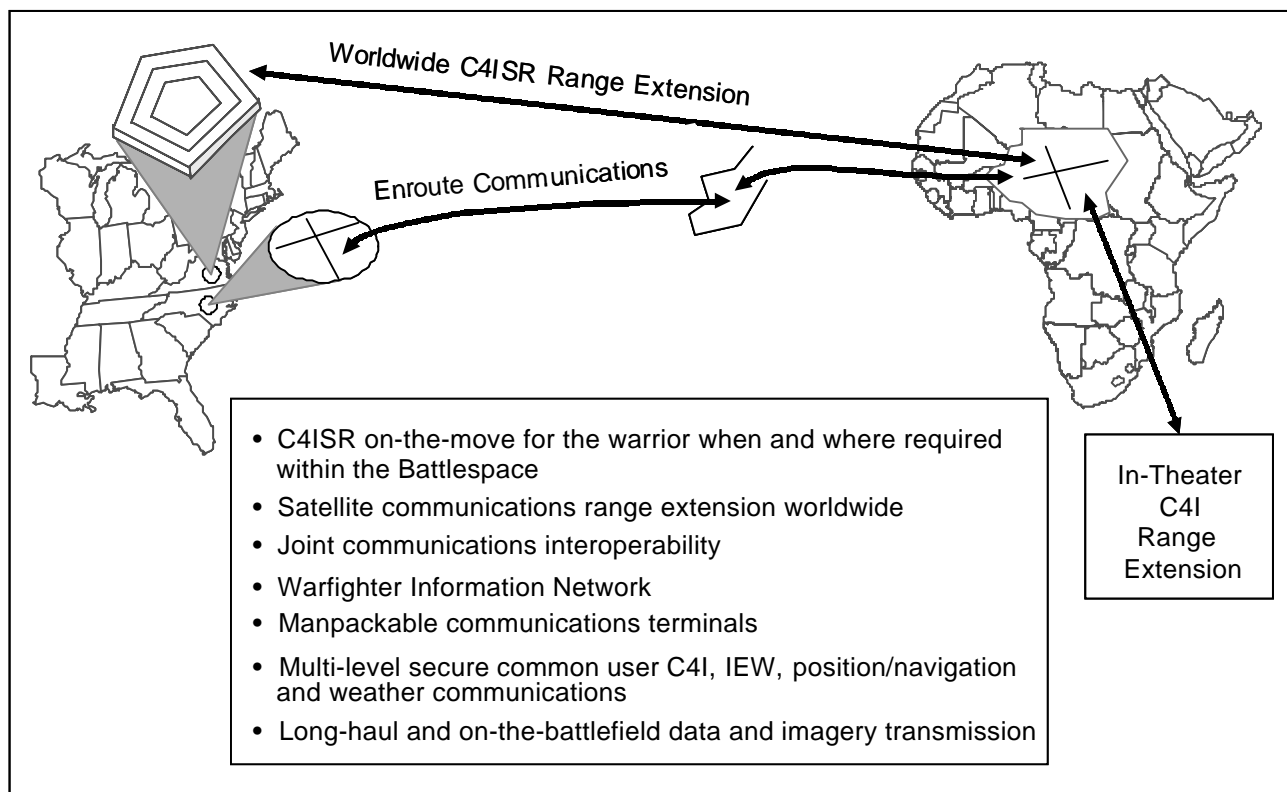

Figure 3-3. Army Warfighter Tactical SATCOM Requirements

The modern battlefield is volatile and requires synchronization of operations throughout its depth. Success on the battlefield will require reliable SATCOM capable of responding to voice, data and imagery information needs over long distances. Extended range, capacity, and coverage make SATCOM ideal for force projection operations. Assured SATCOM access is a requirement that is fundamental to the Army's ability to rapidly deploy on a global basis and then fight any type of war, respond to any contingency, and support military operations other than war.

SATCOM should be considered and could be a valid requirement for all phases of a force projection operation, whether in support of a combat operation or a military operation other than war. FM 100-5 identifies the distinct phases of force projection as mobilization, predeployment, deployment, entry operations (opposed or unopposed), operations, termination of operations and postconflict operations, redeployment and reconstitution, and demobilization. SATCOM can contribute significantly to the success of command and control in any of these phases if careful planning is conducted and the soldiers are adequately prepared and trained in the application of SATCOM.

C4ISR On-The-Move When and Where Required

Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) must be immediately available and accessible to the warfighting commander and his staff. Voice and data traffic will need to be transmitted, and the commander must have the capability to quickly get a comprehensive picture of the battlefield in order to obtain a full understanding of ongoing and planned

actions. Communications mobility must not present a problem for the warfighter: if the warfighter cannot physically carry a needed communications device, it must be integrated into the fighting vehicle or aircraft that he is using. Once deployed, forces must be capable of moving rapidly with their communications. Communications mobility is essential to modern mobile warfare.

Worldwide Range Extension via SATCOM

Reliable, continuous communications must be available to the commander throughout all phases of Army operations regardless of where in the world they are conducted. Long-range communications via satellite offer quick access to certain capabilities without concern for national boundaries and/or political restrictions. Voice and data communications, intelligence, early warning, position and navigation, missile warning, weather, imagery, and data processing are all enhanced by uninterrupted, space-based communications. Long-range communications permit the commander to make informed and accurate decisions as well as to receive advice and guidance. No matter how remote he is from higher or lower echelons, a commander must have long-range communications enabling him to position himself wherever he can best command without being deprived of the ability to respond to opportunities and changing circumstances.

Joint Communications Interoperability

To protect national interests, the Army will operate as part of a joint force. Satellite systems provide the capabilities and infrastructure required to operate in austere environments.

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Interoperability provides the warfighter with access to the global grid for rapid exchange of vital command and control information.

Soldiers on the ground must have the freedom and flexibility to move quickly on the battlefield and not be hindered by heavy, cumbersome communications terminals.

Work is ongoing among the different Army communities to pool their collective assets to replace sole-user SATCOM systems with a single integrated MLS system.

When combined with terrestrial systems, satellites can provide the responsiveness and interoperability needed for joint information exchange. Interoperability encompasses doctrine, procedures, and training as well as systems and equipment.

Interoperability provides the overall ability of warfighter systems to exchange voice, data, and imagery information effectively, in near real-time, as dictated by the operational situation. Interoperability provides the warfighter with access to the global grid for rapid exchange of vital command and control information.

Light, Portable Communications Terminals

Soldiers on the ground must have the freedom and flexibility to move quickly on the battlefield and not be hindered by heavy, cumbersome communications terminals. The Army has a valid requirement for small, lightweight satellite communications terminals that have the capability to meet worldwide, critical command, control, communications, and intelligence requirements. Such small terminals must provide reliable, secure, communications in all operational modes with minimum set-up and tear down times. Other possible features which should be integrated into these terminals include paging, automatic positioning/navigation, messaging, and Command and Control on the move.

Multi-Level, Secure, Common User Communications

The warfighter must be able to communicate over one common system that can protect the information needing to be transmitted/received at the appropriate level of classification. Mixed levels of security have resulted in separate and

redundant systems which are inefficient. Consolidating separate systems into one integrated network is a force multiplier that improves the warfighting commander's decision cycle. Only Multi-Level Security (MLS) can make consolidation possible.

Work is ongoing among the different Army communities to pool their collective assets to replace sole-user SATCOM systems with a single integrated MLS system. Such an MLS system meeting their needs will shift the focus to the needs of warfighters and significantly enhance the Army's capability to achieve land force dominance.

FROM REQUIREMENT TO REALITY : HOW THE PROCESS WORKS

The requirements determination process begins with development of a future warfighting vision by the Training and Doctrine Command (TRADOC) commander. The vision is influenced by national security and military strategies with science and technology as a frame of reference. The vision is further developed in consultation with and review by other military, academia, and industry. When developed sufficiently, the vision is translated into a concept.

A concept is a thought or an idea about the way something should be done. Concepts are broad, with little specific detail. They are not the same as "doctrine" or "vision." Doctrine provides answers and guidance about Army processes today. Visions are broad views describing the way the Army might fight ten to twenty years in the future. Concepts flesh out a vision and attempt to describe an activity or process three to fifteen years out. As the centerpiece of the

requirements determination process, a concept is the first step in determining the requirements for future SATCOM operations.

Experimentation and analysis of potential SATCOM requirements are very important in determining and understanding what capabilities might be critical to a future force. U.S. Army Battle Laboratories are dynamic, innovative organizations whose primary focus is on experimentation supporting Doctrine, Training, Leader Development, Organization, Materiel, Soldiers (DTLOMS) requirements determination. Based on their findings and insights, Battle Labs generate technologies, initiatives, and solution developments are generated to support future operational capabilities. Specific information on the U.S. Army Battle Laboratories programs can be found on the internet at *http:\\www.battlelabs.monroe.army.mil*.

Future Operational Capabilities (FOCs) are specific, structured statements of operational capabilities required by the Army to achieve the ideas contained in warfighting concepts. All SATCOM warfighting requirements must have a tie to one or more FOCs. FOCs are used to focus organizational and functional structure changes through the Force Design Update process as the Army changes to meet the national military strategy guidance. FOCs are reviewed and updated on an annual basis.

SATCOM systems are not acquired on a whim. Like any highly technical and very costly program, there must be a validated, recognized need for a SATCOM solution and a determination that non-materiel answers cannot fill that need. There are three types of Materiel Requirements Documents (MRD) that are important in the exploration and acquisition of new

SATCOM systems. They are the Capstone Requirements Document (CRD), Mission Needs Statement (MNS) and the Operational Requirements Document (ORD).

The CRD is a requirements management document that sets common standards and requirements across a function or mission area such as SATCOM. The CRD ensures any materiel fielded for a SATCOM program is interoperable and maximizes the use of common resources. The CRD cannot be used to justify procurement. Each individual system within the mission area still requires its own ORD. The CRD is a living document, initiated by the Joint Requirements Oversight Council (JROC) and should be periodically reviewed and updated.

The combat developer begins the process to acquire a new SATCOM system by initiating an MNS. The MNS is a formal request to begin defining requirements and exploring different technology concepts to satisfy a mission need. An MNS identifies the Army's need for a materiel solution but does NOT define what the solution should be. The MNS is non-system-specific and defines the requirement in broad operational terms. The MNS for warfighting requirements are approved by the Commanding General (CG), TRADOC. Specific guidance in preparing the MNS can be found in TRADOC Pamphlet 71-9, para 11-2.

The ORD is a definitive statement describing the operational capabilities needed to satisfy a mission need. An ORD is prepared by the combat developer after the MNS and when the combat developer and the materiel developer agree that there is sufficient information to support program initiation. A single MNS may support

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TRADOC Pamphlet 71-9 describes the complete process in determining, documenting, staffing, and approving warfighting requirements under the DTLOMS domain.

The ICDB contains a consolidated repository of all validated DoD SATCOM requirements.

more than one ORD but only one ORD can support one specific system. The approval authority for all ORDs is the CG, TRADOC. Specific guidance in preparing the ORD can be found in TRADOC Pamphlet 71-9, para 11-3.

When the School Commandant or Center Commander signs and finalizes the draft MRD, it will be forwarded to HQ TRADOC, ATCD-AZ for approval. At the same time, the Directorate of Combat Developments will e-mail a copy of the final draft to the appropriate Deputy Chief of Staff for Combat Developments (DCSCD) directorate to begin approval processing. Worldwide staffing of the MRD is prepared there and is staffed to all the addresses on the core staffing list found on the DCSCD Homepage (*www-tradoc.army.mil/dcscd/*). Staffing can be expanded to other commands and agencies based on the mission and interfaces of the proposed system.

Every MRD must also contain an indication of all other Services' interest in the program. This is reflected by a Joint Potential Designator of either Independent, meaning there is little or no potential for other Service interest or development in the program; or Joint Interest, meaning that joint program management is inappropriate but there is a potential for other Service use or systems interface exists; or Joint, meaning that a potential for joint program management, joint funding, and/or joint development or procurement exists. Additional information on the joint process is discussed in TRADOC Pamphlet 71-9, paragraphs 11-12 and 11-13. Understanding the joint process is important because of the requirement for interoperability in DoD SATCOM equipment and systems.

Additionally, a SATCOM program may be designated as Acquisition Category 1 Major Defense Acquisition Program or ACAT 1A Major Automated Information System. This can be due to the program's exceeding certain procurement and/or TDT&E cost thresholds or due to high-level DoD interest. In this case, the MRD would come under the purview of the JROC. The resulting acquisition programs will be reviewed by the Defense Acquisition Executive via the Defense Acquisition Board proceedings. These processes are further described in CJCSI 3170-01, Requirements Generation System, 13 June 1997, (formerly MOP 77) accessible via the web at: *www.dtic.mil/doctrine/jel/cjcsd/cjcsi/*

There are many other aspects to the development of a SATCOM system from requirement to reality. TRADOC Pamphlet 71-9 describes the complete process in determining, documenting, staffing, and approving warfighting requirements under the DTLOMS domain. It can be found on the internet at http://www-tradoc.army.mil.

THE INTEGRATED COMMUNICATIONS DATA BASE

ICDB stands for "Integrated Communications Data Base." Every Army unit, Navy ship, Air Force squadron, or Marine task force that plans on using satellites to communicate must have an ICDB number in order to compete for access to satellite resources. Military Satellite Communications (Milsatcom) resources are joint resources and must be shared among all the Services.

The ICDB contains a consolidated repository of all validated DoD

SATCOM requirements. There are over 3,000 satellite requirements in the ICDB. The data base is managed by the Joint Staff and maintained by the Defense Information Systems Agency. It is critical that every communications planner be familiar with the ICDB. Further information on the ICDB can be found in Annex A.

Getting access to MILSATCOM first requires a validated requirement. Once the requirement is validated and approved by the Chairman, Joint Chiefs of Staff, a number is assigned to that specific requirement. Obtaining an ICDB number is mandatory in order to compete for access to MILSATCOM. It is a necessarily detailed and painstaking process. Satellite resources are limited and not everyone needing satellite communications will be able to obtain an allocation, even though they have an ICDB number.

SUMMARY

Army SATCOM requirements are different for every user. Flexibility, interoperability, global coverage, and assured access are common systems characteristics needed to support operations of all users.

Capacity needed for future space operations is impossible to determine precisely, however, lessons learned, changing force structure, new technology, and evolving doctrine can help shape realistic requirements. Army space objectives include communications, positioning/navigation, reconnaissance, surveillance, target acquisition, weather/environmental monitoring, and strategic defense. Needs will certainly continue to grow and the Army SATCOM architecture must be structured to allow for additional capacity.

The Army's unique role as a warfighting resource demands specific tactical capabilities which include communications on-the-move, joint interoperability, worldwide range extension; small, flexible ground terminals; and multilevel security. The ICDB is the primary planning tool used to support future SATCOM systems development and architecture preparation. Current and future validated requirements are identified in the ICDB. A user cannot obtain access to satellite resources without an approved ICDB registration of his requirement to communicate via SATCOM. Assured access is a fundamental requirement that ensures the Army can fight any type of battle or respond to any contingency on a global basis.

It is critical that every communications planner be familiar with the ICDB.

Obtaining an ICDB number is mandatory in order to compete for access to Milsatcom.

The ICDB is the primary planning tool used to support future SATCOM systems development and architecture preparation.

C4ISR
Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance

CG
Commanding General

CRD
Capstone Requirements Document

DCSCD
Deputy Chief of Staff for Combat Developments

DOD
Department of Defense

DSP
Defense Support Program

DTLOMS
Doctrine, Training, Leader Development, Organization, Materiel, Soldiers

FOC
Future Operational Capabilities

GPS
Global Positioning System

ICDB
Integrated Communications Data Base

JROC
Joint Requirements Oversight Council

JTAGS
Joint Tactical Ground Station

MILSATCOM
Military Satellite Communications

MLS
Multi-Level Security

MNS
Mission Needs Statement

MRD
Materiel Requirements Document

NMS
National Military Strategy

ORD
Operational Requirements Document

RISTA
Reconnaissance, Intelligence, Surveillance, and Target Acquisition

SATCOM
Satellite Communications

SBIRS
Space Based Infrared Radar System

TENCAP
Tactical Exploitation of National Capabilities

TERS
Tactical Event Reporting System

TRADOC
Training and Doctrine Command